

REMARKS

This is intended as a full and complete response to the Office Action dated November 23, 2004, having a shortened statutory period for response set to expire on January 23, 2005. Claims 14-35 remain pending in the application and are shown above. Claims 14-35 are rejected by the Examiner. Reconsideration of the rejected claims is requested for reasons presented below.

Claims 14-28 and 30-35 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of Applicants Admitted Prior Art (AAPA), *Endo et al.*, (US Patent No. 4,532,150), European Patent 0725440, *Loboda et al.*, (US Patent No. 6,159,871), *Zhao*, (US Patent No. 6,071,809), and *Lagendijk*, (US Patent No. 5,028,566), of record. Applicant respectfully traverses the rejection. The Examiner has asserted that it would have been obvious of one of ordinary skill in the art to combine the teachings of *Endo et al.*, European Patent 0725440, *Zhao*, and *Loboda et al.*, and *Lagendijk* to enable the oxide film of the combination to be formed. Applicants respectfully respond to this rejection.

Applicant discloses knowledge of the use of anti-reflective coatings (ARC) and photoresist materials in photolithographic processes for patterning a feature shape on a substrate surface and then etching the feature shape to form a feature definition. Applicants disclose knowledge that prior art anti-reflective coatings (ARC) have had high dielectric constants.

Endo et al. discloses a process for depositing silicon carbide on a substrate. The substrate may be metallic, such as aluminum material.

European Patent 0725440 discloses depositing a silicon carbon barrier layer on a metal surface, such as between two metal layers to prevent interlayer diffusion, or between a metal and a subsequently deposited dielectric material to prevent diffusion of the metal into the dielectric material and insulate layers of wiring.

Loboada et al. discloses depositing a hydrogenated silicon oxycarbide film having low dielectric constant by reacting a methyl-containing silane in a controlled oxygen environment. *Loboada et al.* further discloses increasing or deleting oxygen

providing gas at the appropriate time during the CVD process to form multilayer structures.

Zhao discloses depositing a etch stop over a low k dielectric layer, and the dielectric layer may comprise a variety of dielectric materials including silicon carbide.

Lagendijk discloses depositing a carbon free silicon oxide layer from cyclic siloxane compounds with oxygen.

The AAPA, *Endo et al.*, European Patent 0725440, *Loboada et al.*, and *Zhao*, provide no suggestion or motivation to depositing a first dielectric layer *in situ* on a silicon carbide layer, wherein the first dielectric layer comprises a silicon-oxygen-carbon based material deposited from the plasma enhanced chemical vapor deposition of an organosiloxane, a disilano compound, or combinations thereof. Additionally, *Lagendijk* does not suggest or motivate depositing a silicon-oxygen-carbon based material. Thus, *Lagendijk*, in combination with AAPA, *Endo et al.*, European Patent 0725440, *Loboada et al.*, and *Zhao*, does not teach, show, or suggest depositing a first dielectric layer *in situ* on a silicon carbide layer, wherein the first dielectric layer comprises a silicon-oxygen-carbon based material deposited from the plasma enhanced chemical vapor deposition of an organosiloxane, a disilano compound, or combinations thereof.

Therefore, *Endo et al.*, European Patent 0725440, *Loboada et al.*, *Lagendijk* and *Zhao*, and Applicants disclosure of knowledge, either alone or in combination, do not teach, show or suggest introducing silicon, carbon, and a noble gas into a chamber, initiating a plasma in the chamber, reacting the silicon and the carbon in the presence of the plasma to deposit a silicon carbide layer having a dielectric constant less than 7.0 on the substrate in the chamber, depositing a first dielectric layer *in situ* on the silicon carbide layer, wherein the first dielectric layer comprises a silicon-oxygen-carbon based material deposited from the plasma enhanced chemical vapor deposition of an organosiloxane, a disilano compound, or combinations thereof, and then depositing a photoresist layer, as recited in claim 14 and claims dependent thereon. Withdrawal of the rejection is respectfully requested.

Endo et al., European Patent 0725440, *Loboada et al.*, *Lagendijk* and *Zhao*, and Applicants disclosure of knowledge, either alone or in combination, do not teach, show or suggest depositing a silicon carbide barrier layer on the substrate, depositing a first

dielectric layer *in situ* on the barrier layer, wherein the first dielectric layer comprises a silicon-oxygen-carbon based material deposited from the plasma enhanced chemical vapor deposition of an organosiloxane, a disilano compound, or combinations thereof, depositing an etch stop *in situ* on the first dielectric layer, depositing a second dielectric layer *in situ* on the etch stop, depositing a silicon carbide anti-reflective coating *in situ* on the second dielectric layer, and depositing a photoresist layer on the silicon carbide anti-reflective coating, as recited in claim 26, and claims dependent thereon. Withdrawal of the rejection is respectfully requested.

Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Applicants Admitted Prior Art (AAPA), *Endo et al.*, (US Patent No. 4,532,150), European Patent 0725440, *Loboda et al.*, (US Patent No. 6,159,871), *Zhao*, (US Patent No. 6,071,809), and *Lagendijk*, (US Patent No. 5,028,566) as applied to claims 14-28 and 30-35 above, and further in view of *Subrahmayan et al.*, (US Patent No. 6,107,192). The Examiner asserts that it would have been within the scope of one of ordinary skill in the art to combine the teachings of *Endo et al.*, European Patent 0725440, *Loboda et al.*, *Lagendijk*, and *Zhao* and *Subrahmayan et al.* to include a nitrogen/hydrogen plasma cleaning.

AAPA, *Endo et al.* '150, European Patent 0725440, *Loboda et al.*, *Lagendijk* and *Zhao* are described above. *Subrahmayan et al.* discloses a precleaning process for cleaning dielectric materials by a plasma of reactive gas such as oxygen, a mixture of CF_4/O_2 , or a mixture of He/NF_3 , with the plasma generated by a remote plasma source.

Subrahmayan et al., either alone or in combination with *Endo et al.* '150, European Patent 0725440, *Loboda et al.* '947, *Lagendijk* and *Zhao*, does not teach, show or suggest depositing a silicon carbide barrier layer on the substrate, depositing a first dielectric layer *in situ* on the barrier layer, wherein the first dielectric layer comprises a silicon-oxygen-carbon based material deposited from the plasma enhanced chemical vapor deposition of an organosiloxane, a disilano compound, or combinations thereof, depositing an etch stop *in situ* on the first dielectric layer, depositing a second dielectric layer *in situ* on the etch stop, depositing a silicon carbide anti-reflective coating *in situ* on the second dielectric layer, and depositing a photoresist layer on the silicon carbide anti-reflective coating, and further comprising removing a contaminant on the substrate

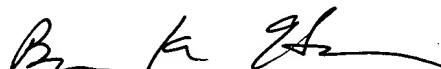
by introducing a reducing agent comprising nitrogen and hydrogen into a chamber, initiating a reducing plasma in the chamber, exposing an oxide on the substrate to the reducing agent, as recited in claim 29, and claims dependent thereon. Withdrawal of the rejection is respectfully requested.

In conclusion, the references cited by the Examiner, alone or in combination, do not teach, show, or suggest the invention as claimed.

The secondary references made of record are noted. However, it is believed that the secondary references are no more pertinent to the Applicant's disclosure than the primary references cited in the office action. Therefore, Applicant believes that a detailed discussion of the secondary references is not necessary for a full and complete response to this office action.

Having addressed all issues set out in the office action, Applicant respectfully submits that the claims are in condition for allowance and respectfully request that the claims be allowed.

Respectfully submitted,



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